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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

INADOMI, MICHAEL J

ART UNIT

PAPER NUMBER

2883

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/603,990	Applicant(s) NAM ET AL.	
	Examiner Michael Inadomi	Art Unit 2883	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 August 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,8-15 and 17-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,8-15 and 17-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

The drawings are objected to because in Fig. 7H, drain contact hole h3 (of Fig. 7G) through the second inorganic material layer 152 is absent. Fig. 7H should be corrected so that the pixel electrode 167 penetrates the second inorganic material layer 152 in order to contact the drain electrode 144 in the manner shown in Fig. 8. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 21 is objected to because of the following informalities:

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In lines 11 and 12 of claim 21, the recitation “an inorganic material layer covering the entire surface of the substrate including the gate line, the data line, and the thin film transistor;” should be changed to read “an inorganic material layer covering substantially the entire surface of the substrate including the gate line, the data line, and the thin film transistor;” for the reason that the inorganic material layer is absent at least in the area of the drain contact hole (as shown in Fig. 8).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-5, 8-15, and 17-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites in lines 9 and 10 a “drain electrode being an electrode attached to a drain region of the thin film transistor and not overlapping the pixel region”, which is unclear to the examiner for the reason that the scope of the claim language does not appear to be in concordance with Applicant’s arguments pertaining to the scope of the claim language.

The spatial extent of the drain region as defined within the claim language is capable of being interpreted in multiple different ways due to the fact that the language itself does not differentiate between the drain electrode being a mere portion of a piece of conductive material touching the drain region of the TFT which is adjacent to the channel region or the drain

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electrode being a single contiguous, conductive object directly connected to both the drain region of a TFT and a pixel electrode (as discussed in lines 7-9 of page 6 of the office action dated June 3, 2010). However, in the context of Applicant's arguments (cf. lines 9-21 of page 12 of the Remarks dated August 30, 2010) it appears that Applicant meant for the spatial extent of the drain electrode to be interpreted specifically as to include the entirety of a single contiguous conductive object contacting both the drain region of a TFT and a pixel electrode. For the purposes of examination, the examiner will interpret the aforementioned recitation of lines 9 and 10 of claim 1 as reading "drain electrode being an electrode directly connected to a drain region of the thin film transistor" and will interpret line 18 of claim 1 as reading "a pixel electrode on the reflective layer, wherein the pixel electrode is in direct contact with the drain electrode;"

Claims 10, 12, 19, and 21 are unclear for the same reasons and will be reinterpreted by the examiner in an analogous manner to that described above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 8, 9, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ha et al. (US PGPub No. 2003/0058389 A1) in view of Maeda et al. (US PGPub No. 2002/0140887 A1).

Applicant note: Ha et al. (US PGPub No. 2003/0058389 A1) may be subject to 35 U.S.C. 103(c) exclusion.

Regarding **claim 1**, Ha et al. teach a transfective liquid crystal display device (cf. 10A-10D with reference to Fig. 3), comprising a substrate 311 having a switching portion, a reflective portion, and a transmissive portion, a pixel region being defined to include the reflective and transmissive portions (cf. Fig. 3), a gate line 325 (cf. paragraph 67) on the substrate, a data line 338 crossing the gate line (cf. Fig. 3), a thin film transistor connected to the gate line and the data line and including a gate electrode 323, an active layer 331, and source and drain electrodes 335 and 337 (cf. paragraph 67), the thin film transistor and the drain electrode on the switching portion (cf. Fig. 3), and the drain electrode being an electrode directly connected to a drain region of the thin film transistor (cf. Fig. 10D) and not overlapping the pixel region.

Ha et al. further teach a first insulating layer 343 within the reflective portion, a second insulating layer 353 (cf. paragraph 70 and Fig. 10D) made of an organic material on the first insulating layer, the second organic material layer having an open portion 357 at the transmissive portion, a reflective layer 349 on the first insulating layer having a transmissive hole at the open portion (cf. Fig. 10D), the reflective layer disposed on the pixel region and not overlapping the drain electrode, and a pixel electrode 365 on the reflective layer and in direct contact with the drain electrode (cf. Fig. 10D). Ha et al. further teach (cf. paragraph 9 and Fig. 2) an opposing substrate 15 facing the substrate and a common electrode 13 on an inner surface of the opposing substrate, the common electrode being substantially flat.

Ha et al. do not explicitly disclose the presence of a plurality of uneven patterns consisting of a first organic material layer within the reflective portion, the uneven patterns

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partially covering the substrate, a second organic material layer on the first organic material layer, the second organic material layer having an open portion at the transmissive portion, and a reflective layer on the second organic material layer having a transmissive hole at the open portion.

However, Maeda et al. teach an analogous transflective LCD (cf. Fig. 10K) wherein the insulating layer under the reflective layer 31 and the pixel electrode 81 has a plurality of uneven patterns consisting of a first organic (cf. paragraph 74) material layer 51 within the reflective portion, the uneven patterns partially covering the substrate, and a second organic material layer 52 on the first organic material layer. It would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the invention of Ha et al. by providing the first insulating layer 343 of Ha et al. as a thin inorganic passivation layer analogous to layer 54 of Maeda et al., providing a plurality of uneven patterns consisting of a first organic material layer within the reflective portion, the uneven patterns partially covering the substrate, providing the second insulating layer 353 of Ha et al. as a second organic material layer on the first organic material layer, and providing the reflective layer on the second organic material layer, as taught by Maeda et al., motivated by the desire to make the surface of the reflective layer bumpy in order to diffusely reflect light off the surface of the reflective layer, thus improving display quality. The examiner notes that a person having ordinary skill in the art would have maintained the open portion 357 of Ha et al. in the second organic material for the purpose of matching the retardation of the transmissive and reflective portions (cf. paragraph 70 of Ha et al.).

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Regarding **claims 2 and 3**, the first and second organic material layers are formed from a photosensitive material comprising a photo-acrylic resin PC403 (cf. paragraph 74 of Maeda et al.).

Regarding **claim 4**, Ha et al. teach the presence of an inorganic material layer 343 covering the gate line, the data line, and the thin film transistor (cf. Fig. 10D and paragraph 71).

Regarding **claim 5**, Ha et al. further teach the inorganic material layer as being formed of one of silicon nitride and silicon oxide (cf. paragraph 68).

Regarding **claim 8**, Ha et al. further teach the presence of a gate pad 327 connected to the gate line (cf. Fig. 3 and paragraph 67), a data pad 341 connected to the data line, and a capacitor electrode 339 overlapping the gate line.

Regarding **claim 9**, in the invention Ha et al. as modified by Maeda et al., the second organic material layer is formed as a replacement of the second insulating layer 353 of Ha et al., which has a drain contact hole 355 (cf. Fig. 10D) exposing the drain electrode, a gate pad contact hole 361 exposing the gate pad, and a data pad contact hole 363 exposing the data pad. At the time of the invention, it would have been obvious to a person having ordinary skill in the art in the above modification of Ha et al. by Maeda et al. to form the second organic material layer to have those same contact holes in order to facilitate electrical connections between various parts of the device.

Regarding **claim 21**, Ha et al. teach the presence of an inorganic material layer 343 covering substantially the entire surface of the substrate including the gate line, the data line, and the thin film transistor (cf. Fig. 10D and paragraph 71).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ha et al. (US PGPub No. 2003/0058389 A1) as modified by Maeda et al. (US PGPub No. 2002/0140887 A1), as applied to claim 1 above, and further in view of Kubota et al. (US PGPub No. 2002/0171792 A1).

Considering the additional limitations of claim 10, the invention of Ha et al. as modified by Maeda et al. teaches a liquid crystal layer 14 (cf. Figs. 1 and 2) interposed between the common electrode and the pixel electrode, wherein the pixel electrode and the common electrode are separated by a first cell gap in the transmissive portion, and a second cell gap in the reflective portion (cf. Fig. 10D). However, the invention of Ha et al. as modified by Maeda et al. does not explicitly disclose the first cell gap as being twice greater than the second cell gap.

Kubota et al. teach an analogous transfective liquid crystal display wherein a first cell gap in a transmissive portion is twice greater than a second cell gap in a reflective portion (cf. paragraph 84). At the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify the invention of Ha et al. as modified by Maeda et al. to have the first cell gap twice greater than the second cell gap, as taught by Kubota et al., in order to match the retardation of the liquid crystal layer in the reflective and transmissive portions and thereby improve display quality.

Claims 11-15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ha et al. (US PGPub No. 2003/0058389 A1) as modified by Maeda et al. (US PGPub No. 2002/0140887 A1) and Kubota et al. (US PGPub No. 2002/0171792 A1), as applied to claim 10 above, and further in view of admitted prior art.

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Regarding the additional limitations of **claims 12 and 19**, the invention of Ha et al. as modified by Maeda et al. discloses the method of fabricating the above LCD, including formation of the first and second organic material layers from a photosensitive material (cf. paragraph 74 of Maeda et al.) except perhaps for the step of performing an exposure and development process on the first and second photosensitive organic material layers. Maeda et al. discuss using organic layers which are photosensitive, but do not necessarily disclose the particular patterning steps recited. The admitted prior art (cf. page 7 of the office action mailed June 3, 2010) states that performing an exposure and development process on organic layers was well known. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by this being the standard technique for patterning organic materials in the art.

Regarding **claims 11 and 20**, the difference in cell gaps is provided by the height of the organic material layers, and for the first (transmissive) cell gap to be twice the second (reflective) cell gap, the height needs to be equal to the second cell gap. The uneven patterns are equal to or less than this height, so they have a height equal to or less than the second cell gap. Even were this not true, adjusting the height of the uneven patterns to improve the reflective properties of the reflective layer, or to optimize the relative cell gaps for better liquid crystal behavior, would have been obvious to one of ordinary skill in the art at the time of the invention, motivated by the desire to optimize these features of the device.

Regarding **claim 13**, the invention of Ha et al. as modified by Maeda et al., Kubota et al., and admitted prior art teaches the first and second photosensitive material layers as being formed of the photo-acrylic resin PC403, made by JSR Co. (cf. paragraph 74 of Maeda et al.).

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Regarding **claim 14**, Ha et al. teach the method as further comprising forming an inorganic material layer 343 covering the gate line, the data line, and the thin film transistor (cf. Fig. 10D and paragraph 71).

Regarding **claim 5**, Ha et al. further teach the inorganic material layer as being formed of one of silicon nitride and silicon oxide (cf. paragraph 68).

Regarding **claim 17**, Ha et al. further teach the formation of a gate pad 327 connected to the gate line (cf. Fig. 3 and paragraph 67), a data pad 341 connected to the data line, and a capacitor electrode 339 overlapping the gate line.

Regarding **claim 18**, in the invention Ha et al. as modified by Maeda et al., Kubota et al., and admitted prior art, the second organic material layer is formed as a replacement of the second insulating layer 353 of Ha et al., which has a drain contact hole 355 (cf. Fig. 10D) exposing the drain electrode, a gate pad contact hole 361 exposing the gate pad, and a data pad contact hole 363 exposing the data pad. At the time of the invention, it would have been obvious to a person having ordinary skill in the art in the above modification of Ha et al. by Maeda et al. to form the second organic material layer to have those same contact holes in order to facilitate electrical connections between various parts of the device.

Response to Arguments

Applicant's arguments with respect to claims 1-5, 8-15, and 17-21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Paragraph 102 of Sakamoto et al. (US PGPub No. 2003/0030768 A1) teaches that PC403, made by JSR Co. is a photo-sensitive acrylic resin.

Fig. 4 of Ha et al. (US PGPub No. 2003/0081159 A1) teaches a transfective liquid crystal display pixel wherein the drain electrode does not overlap the reflective layer. The examiner notes that if common ownership is established between Ha et al. '389 (US PGPub No. 2003/0058389 A1), used in the above rejection under 35 U.S.C. 103(a), and the present application, the additional establishment of common ownership between Ha et al. '159 and the present application may help expedite prosecution.

Fig. 5 of Baek (US PGPub No. 2003/0071944 A1) teaches a transfective liquid crystal display pixel wherein the drain electrode does not overlap the reflective layer. The examiner notes that if common ownership is established between Ha et al. '389 (US PGPub No. 2003/0058389 A1), used in the above rejection under 35 U.S.C. 103(a), and the present application, the additional establishment of common ownership between Baek and the present application may help expedite prosecution.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Inadomi whose telephone number is (571)270-7808. The examiner can normally be reached on Monday through Thursday, 9 a.m. through 6:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark A. Robinson can be reached on (571)272-2319. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark A. Robinson/
Supervisory Patent Examiner, Art Unit 2883

/M. I./
Examiner, Art Unit 2883